REMARKS

Claims 13-27, 34-47, and 50-52 will be pending upon entry of the present response.

Applicants thank the Examiner for indicating the allowability of claims 13-27 and 34-46.

The Examiner has rejected claims 47 and 50-52 under 35 U.S.C. § 103(a) as being unpatentable over Chan *et al.* (5,917,226, hereafter *Chan*) in view of Shaw *et al.* (U.S. Patent No. 5,847,454, hereafter *Shaw*).

In the discussion that follows, When citing to specific passages of references, these will be indicated by a column number separated from a line number by a colon, e.g., "4:22" as indicating column 4, line 22.

Applicants respectfully traverse the rejections on the basis that Shaw cannot be combined with Chan for the purpose of rejecting the claims of the present application, as explained hereafter.

First, each reference teaches away from such a combination. Shaw's device employs capacitive coupling for operation to drive or detect the degree of movement of a mass within a range of movement (*see Shaw*, 5:19-30, 14:6-22, and 17:60-65, for example). Such a structure relies on the capacitor formed by the "close proximity" of two conductive plates (*id.*, at 14:11). As the distance between the plates changes, so too does the capacitance. Because of the capacitive coupling of the Shaw device, it is inherently an analog device, in which the capacitance varies across a range. In order to operate with digital systems, it is therefore necessary to convert a signal from analog to digital, in the case of a sensor, or from digital to analog, in the case of an actuator. If there were actual electrical contact between the movable mass and the surrounding walls, the capacitor would short out, which, at the very least, would cause the associated circuit to malfunction, and at worst, would destroy the circuit. In cases where such contact is a danger, Shaw teaches the formation of "a thin passivation oxide layer … to prevent shorting between moving structures." *Id.*, 6:62-65. Thus, Shaw teaches away from a device such as Chan's in which electrical contact is a potential and acceptable event.

For its part, Chan is a purely binary, i.e., digital device. It functions as a switch, relying on electrical contact between a cantilever beam and the contact surface of the substrate to

indicate changes in a binary state, i.e., *open* and *closed* (*Chan*, 7:13-15). It registers either one of only those two states: open and closed. Chan also discusses the disadvantages of various analog devices, and concludes that such devices "produce analog outputs which often are not readily compatible with associated detection circuitry or logic circuitry. Also, processing or detecting circuitry can increase overhead and costs associated with producing a microsensor, and especially an integrated sensor." *Id.*, 1:65-2:3, (*see*, *also*, 1:34-65). Thus, Chan teaches away from analog devices such as that taught by Shaw.

Because the references teach away from each other, a combination for the purposes of rejecting the claims is inappropriate. Even if the combination were capable of producing the claimed invention, the claims would be allowable: "when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740, 82 U.S.P.Q.2d 1385 (2007).

Second, a combination of Shaw and Chan would render one or the other unsuitable for its intended purpose (*see* MPEP § 2143.01, subsection V ([i]f [a] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification)). Shaw's device is intended primarily to operate as an accelerometer or actuator (*see Shaw*, 3:42-47) that operates across a "wide range of motion or sensitivity." *Id.*, 5:40, 41. Chan's device is intended to operate as a thermal sensor. "When the temperature of the beam changes, the switch 20 closes and the low input is received by the inverter so that the output from the inverter is high." *Id.*, 7:4-7. Inherently, such a binary-type device can only indicate a single value, rather than a range of values, and thus would be configured to transition when a changing temperature crosses a selected temperature. Such a device is advantageous in a situation where it is desirable to maintain an environment at or near a specific temperature, because its simplicity of operation would make it less expensive to manufacture and more reliable to operate than an analog device whose broader range of response would be unnecessary and undesirable. This is even more the case where the analog device in question (i.e., Shaw's device) is not capable of providing *any* temperature response, but is instead an accelerometer or actuator. A combination of these references would necessarily render one or the other unsuitable for its intended purpose.

Third, a combination of Shaw and Chan would change the principle of operation of one or the other reference (*see* MPEP § 2143.01, subsection VI ([i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious)). Shaw's device operates across a range of positions by capacitive coupling, while Chan's device operates in a binary manner by electrical contact. KSR teaches that "a court [or Examiner] must ask whether the improvement is more than the predictable use of prior art elements *according to their established functions*. KSR, , 127 S.Ct., at 1740 (emphasis added). In the present case, Shaw and Chan cannot be combined in a way that each operates according to its established function, but would instead require a change of the principle of operation of at least one of the devices.

Fourth, in justifying the combination of Shaw with Chan, the Examiner quotes *ex parte* Smith (83 USPQ2d 1509 (2007), which states that "where the improvement is no more than the simple substitution of one known element for another or 'the mere application of a known technique to a piece of prior art ready for improvement,' no further analysis [is] required by the Examiner" (quoting from *KSR*). While Applicants do not disagree with the principle expressed by *Smith*, they do disagree with its relevance to the present case. The references relied upon in the present case do not lend themselves to "simple substitution," and thus cannot be disposed of without further analysis.

In *Smith*, the BPAI considered an appeal in which the appellant had claims directed to a pocket insert, as for a CD disk, etc., on a page that was to be bound in a book. One issue under consideration was "whether it would have been obvious to glue two separate sheets [of paper] to form a continuous two-ply seam …, rather than folding one sheet to create a seam along the folded edge …," and a second issue was "whether it would have been obvious to improve a pocket insert by creating two pockets from a single pocket using an additional line of adhesive." *Smith*, 83 USPQ2d at 1513-14. Each of the relevant prior art references was directed to pocket inserts configured to be bound into books, and they all functioned substantially identically to each other. The elements of those references could be very easily substituted from one to another or modified using the techniques taught by the others, and were therefore appropriately found to be combinable to render the claims obvious.

In the present case, however, Shaw and Chan do not bear such similarities to each other. The manufacturing steps employed in their manufacture, their respective structures, and their respective functions are each very different from those of the other. Shaw is directed to a device that is formed within a cavity in a substrate through an extensive series of process steps that includes at least four separate etch steps and a number of deposition steps of various types. These are described with reference to Figures 1A-1J at 8:26-13:9. In operation, Shaw's device functions primarily on a lateral plane, moving or sensing movement within a plane that lies parallel to the upper surface of its substrate, as well as torsion out of that plane, and employs capacitive coupling for operation to drive or detect the degree movement of a mass within a range of movement.

In contrast, Chan employs a relatively simple series of steps to form its structure on the upper surface of the substrate, as described, for example, at 9:33-54. In operation, Chan's device flexes in a vertical direction, i.e., perpendicular to the upper surface of its substrate (*Chan*, 7:9-13 and 9:24-30), and functions as a switch, relying on electrical contact between a cantilever beam and the contact surface of the substrate to indicate changes in its binary state, i.e., *open* and *closed* (*Chan*, 7:13-15). It can be seen that a combination of Chan with Shaw would involve much more that simple substitution, and so does not fall within the scope of the *Smith* analysis.

Finally, one of skill in the art of the present invention would not consider the teachings of the references to be combinable under KSR using common knowledge or common sense of one of ordinary skill in the art (*see KSR*, 127 S.Ct., at 1742). Shaw and Chan are directed to entirely different kinds of operation. Shaw's device is configured to respond to motion (as an accelerometer) or to move (as an actuator) across a range of motion, and to detect or create incremental changes in the position of its mobile mass by virtue of its capacitive coupling (*Shaw*, 5:19-30 and 14:6-22), while Chan is directed to a temperature sensor that comprises a beam having two layers that have different thermal expansion coefficients, and operates on the same principle as a bi-metallic temperature sensor (see *Chan*, 5:33-60). A change in temperature will cause the beam to flex until it contacts the underlying contact layer, closing a connection and permitting electrical current to flow through the connection. It can be seen that there is nothing in either of these two devices that would motivate a combination with the other, or that would benefit from such a combination.

For all of the reasons outlined above, a combination of Shaw with Chan cannot be relied upon in rejecting the claims of the present application. Even if, as the Examiner notes, Shaw teaches that its devices can be integrated with a wide range of other micromechanical structures and circuits on a common substrate (*Office Action*, page 4), integration of Chan's device on a common substrate with Shaw's would merely result in two separate and independent devices, side-by-side, and would not produce a device as claimed in the present application, under any reasonable circumstances.

In light of the above remarks, Applicants respectfully submit that all pending claims are allowable, and therefore request that the Examiner reconsider this application and timely allow all pending claims. Examiner Erdem is encouraged to contact Mr. Bennett by telephone at (206) 694-4848 to discuss the above and any other distinctions between the claims and the applied references, if desired. If the Examiner notes any informalities in the claims, he is encouraged to contact Mr. Bennett by telephone to expeditiously correct such informalities.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

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